

WHAT IS CLAIMED IS:

1. A magnetic memory device formed on a substrate comprising:
 - a pinned layer magnetized in a first direction and patterned to a first width; and
 - 5 a sense layer that can be selectively magnetized in the first direction or a second direction that is opposite the first direction so as to change the net resistivity of the magnetic memory device, and wherein the sense layer is patterned to a second width that is at least less than the first width to thereby reduce magnetic coupling between the pinned and sense layers.
- 10 2. The device of Claim 1, wherein the substrate comprises a conductor formed therein.
3. The device of Claim 2, wherein the pinned layer is formed above the substrate so as to overlie the conductor.
- 15 4. The device of Claim 3, wherein the magnetic memory device further comprises a tunnel layer that is formed so as to overlie the pinned layer and be interposed between the pinned layer and the sense layer.
5. The device of Claim 4, wherein the sense layer is formed so as to overlie the tunnel layer.
- 20 6. The device of Claim 1, wherein the sense layer comprises a variable magnetic field that can be varied by the application of an external field to thereby change the combined magnetic characteristic of the pinned and sense magnetic layers.
7. The device of Claim 1, wherein the pinned layer is formed of nickel iron (NiFe), the tunnel layer is formed of aluminum oxide (Al_2O_3) and the sense layer is formed of nickel iron cobalt (NiFeCo).
- 25 8. The device of Claim 1, further comprising a spacer that is positioned about the outer lateral edges of the sense layer.
9. The device of Claim 8, wherein the spacer is interposed between the outer lateral edges of the sense layer and the pinned layer.

10. The device of Claim 9, wherein the spacer is formed of a non-conducting material.
11. The device of Claim 10, wherein the spacer is formed of a material selected from the group consisting of silicon nitride (SiN), SiC, and a-carbon.
- 5 12. A magnetic memory device comprising:
- a substrate having an opening formed therein;
- a conductor formed within the opening of the substrate;
- a pinned layer formed above the substrate so as to overlie the conductor, wherein the pinned layer is magnetized in a first direction, and wherein the pinned layer is patterned to a first width;
- a tunnel layer formed above the pinned layer so as to overlie the pinned layer, wherein the tunnel layer is patterned to the first width; and
- a sense layer formed above the tunnel layer so as to overlie the tunnel layer, wherein the sense layer can be selectively magnetized in the first direction or a second direction that is opposite the first direction so as to change the net resistivity of the magnetic memory device, and wherein the sense layer is patterned to a second width that is at least less than the first width to thereby reduce magnetic coupling between the pinned and sense layers.
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